

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L4	821	(715/764).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/07 18:29
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L6	4672	(707/3).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/07 18:30
L7	1678	(707/4).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/07 18:30
L8	4370	(707/10).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/07 18:30
L9	3711	(707/104.1).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2005/01/07 18:30
L10	1727	object with model with relationship	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/01/07 18:31

L11	37207	select\$4 near8 relationship	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/01/07 18:32
L12	65	10 same 11	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/01/07 18:32
L13	17	12 and browser	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/01/07 18:32



US006775674B1

(12) **United States Patent**  
**Agassi et al.**

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(45) **Date of Patent:** **Aug. 10, 2004**

(54) **AUTO COMPLETION OF RELATIONSHIPS  
 BETWEEN OBJECTS IN A DATA MODEL**

(75) Inventors: **Shai Agassi**, Los Gatos, CA (US); **Udi Ziv**, Ra'anana (IL); **Hannan Shulman**, Ra'anana (IL)

(73) Assignee: **SAP Aktiengesellschaft**, Walldorf (DE)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/276,182**

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#### Related U.S. Application Data

(60) Provisional application No. 60/079,584, filed on Mar. 26, 1998.

(51) Int. Cl.<sup>7</sup> ..... **G06F 17/00**

(52) U.S. Cl. .... **707/100; 707/1; 707/2**

(58) Field of Search ..... **707/1-10, 100-104.1, 707/509**

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*Primary Examiner*—Jean M. Corrielus

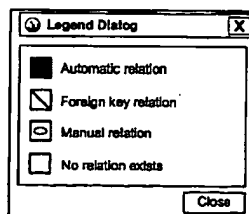
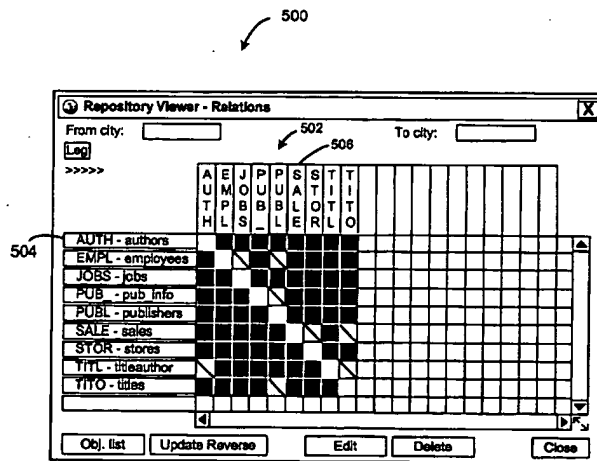
*Assistant Examiner*—Joon Hwan Hwang

(74) *Attorney, Agent, or Firm*—Townsend and Townsend and Crew LLP

(57) **ABSTRACT**

In a computer system including a database system wherein queries to the database system can be specified by selecting a first object and a second object, with a query result being based on a relationship between the first object's metadata and the second object's metadata, relationships are generated by automatically populating a relationship matrix having undefined relation cells therein from pre-defined relationships represented by defined relation cells in the relationship matrix and transitively completing a local set of relationships defined in the relationship matrix.

**8 Claims, 7 Drawing Sheets**





US006701321B1

(12) **United States Patent**  
Tsai(10) Patent No.: **US 6,701,321 B1**(45) Date of Patent: **\*Mar. 2, 2004**(54) **METHOD AND APPARATUS FOR  
NAVIGATION OF RELATIONAL DATABASES  
ON DISTRIBUTED NETWORKS**5,895,468 A \* 4/1999 Whitmyer, Jr. .... 707/10  
5,913,210 A \* 6/1999 Call ..... 707/4  
5,913,214 A \* 6/1999 Madnick et al. .... 707/10(76) Inventor: **Daniel E. Tsai**, 39 Bayberry Dr.,  
Atkinson, NH (US) 03811(\*) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 0 days.This patent is subject to a terminal dis-  
claimer.**OTHER PUBLICATIONS**"Object-Oriented Analysis and Design with Applications",  
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(List continued on next page.)

(21) Appl. No.: **09/524,108**(22) Filed: **Mar. 13, 2000****Related U.S. Application Data**(63) Continuation of application No. 08/982,467, filed on Dec. 2,  
1997, now Pat. No. 6,038,566.(60) Provisional application No. 60/032,773, filed on Dec. 4,  
1996.(51) Int. Cl.<sup>7</sup> ..... **G06F 17/30**(52) U.S. Cl. .... **707/102; 707/3; 707/4;**  
**707/103 R; 707/10; 709/201; 709/229;**  
**709/219**(58) Field of Search ..... **707/102, 3, 4,**  
**707/10, 103 R; 709/201, 203, 219, 229**(56) **References Cited****U.S. PATENT DOCUMENTS**5,355,472 A \* 10/1994 Lewis ..... 707/101  
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5,878,417 A \* 3/1999 Baldwin et al. .... 707/10  
5,878,418 A \* 3/1999 Polcyn et al. .... 707/10*Primary Examiner*—Jean R. Homere(74) *Attorney, Agent, or Firm*—Fish & Richardson P.C.(57) **ABSTRACT**Relational databases are browsed in a manner that mirrors  
the interactive browsing of world wide web pages. A  
schema-based navigational layer is used on top of conven-  
tional physical, logical and conceptual database schema  
layers, to dynamically map data stored in a relational data-  
base onto web pages. The navigational schema or schema  
base is an independent abstraction from the underlying  
conceptual database schema. The schema base is con-  
structed from relationships and information models. The  
schema base can be reused or derived from the database  
design process or produced specifically for navigation  
through the database. An object-role schema base is used to  
demonstrate the traversal of relational information in a  
regenerative, propagative manner. Navigating a database via  
the presented-schema extends the conventional database  
concept of the logical view to an interactive model of logical  
view-transitions. The technique is a simple and powerful  
model for automated access to relational databases making  
available vast amounts of data stored in relational databases  
for Internet and intranet web browsing.**8 Claims, 16 Drawing Sheets**